

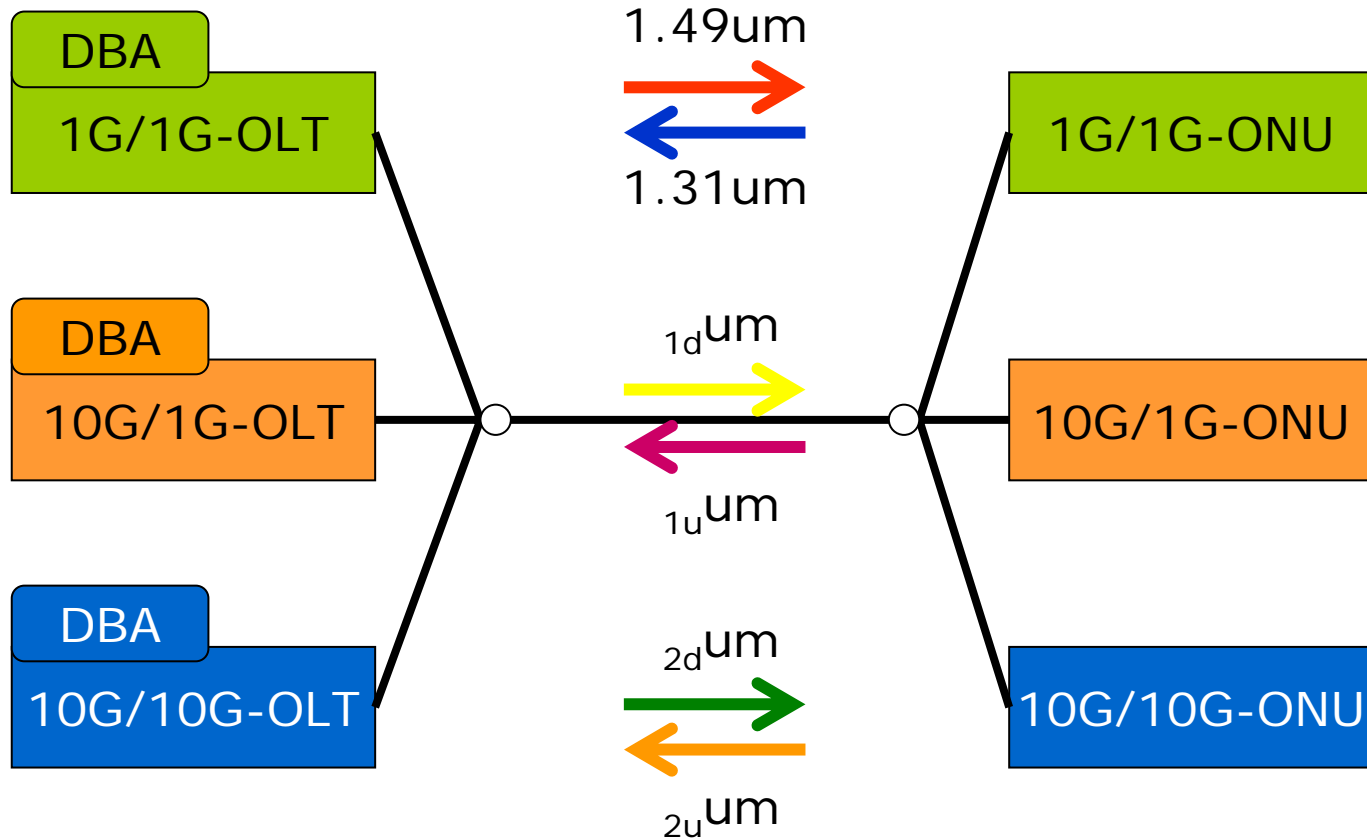
Coexistence between 10GEPON and 1GEPON



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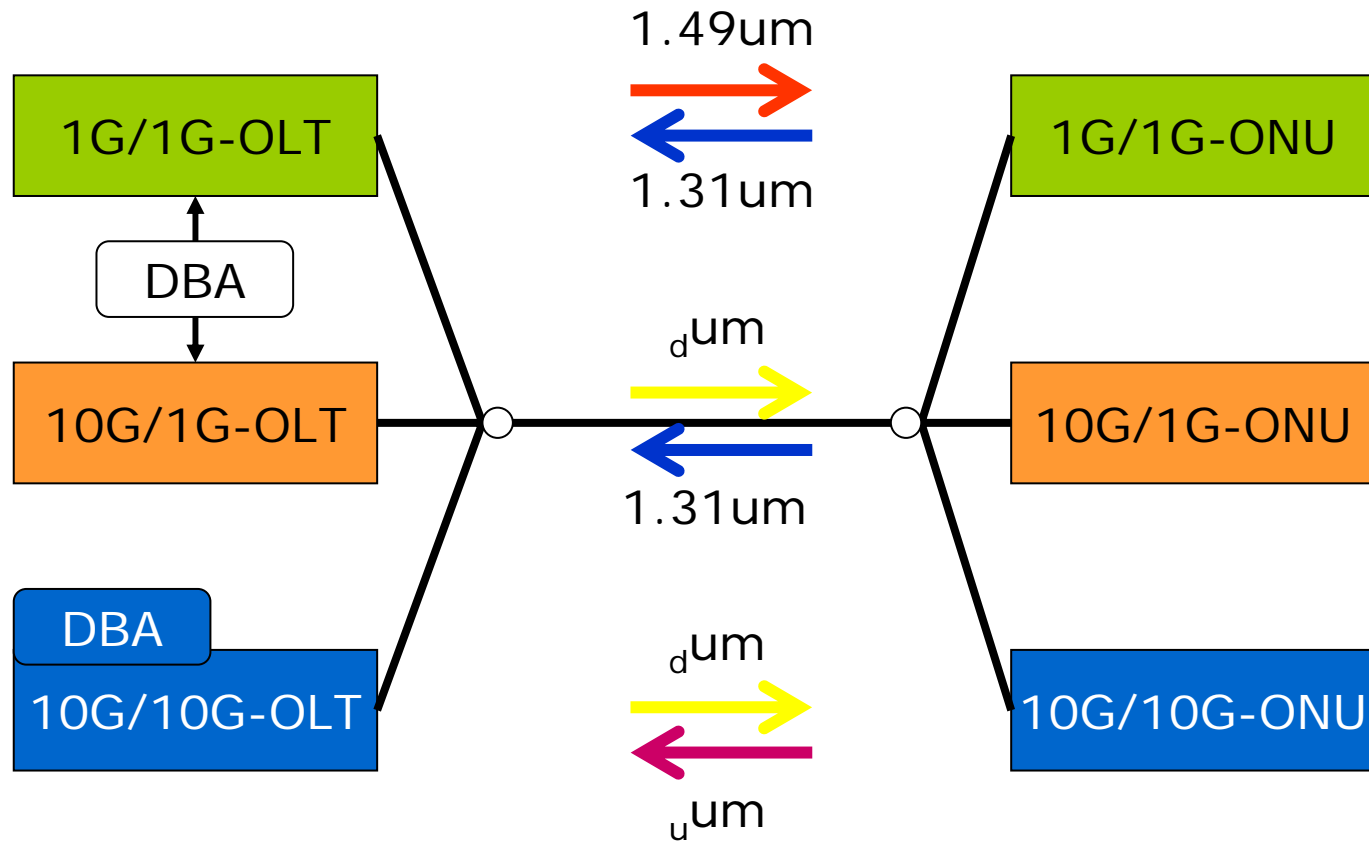
Possible solutions

Solution 1 ... Full WDM



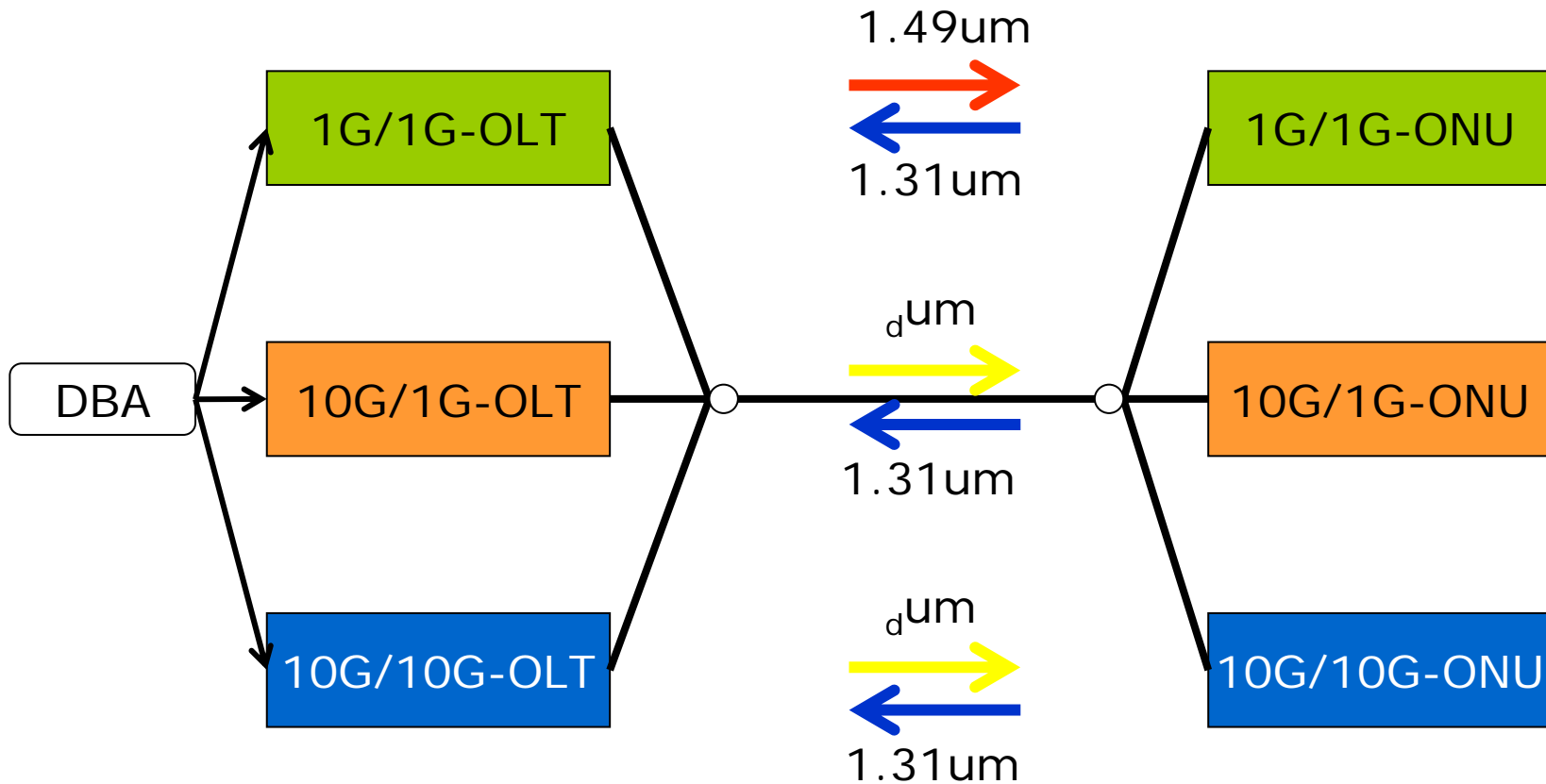
Possible solutions

Solution 2 ... 10G/1G WDM (Same wavelength for same bit rate)



Possible solutions

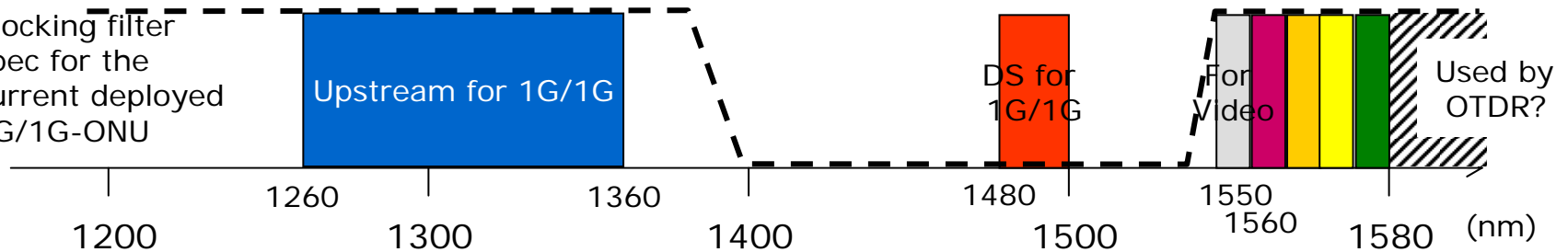
Solution 3 ... Upstream TDM (Same wavelength for upstream)



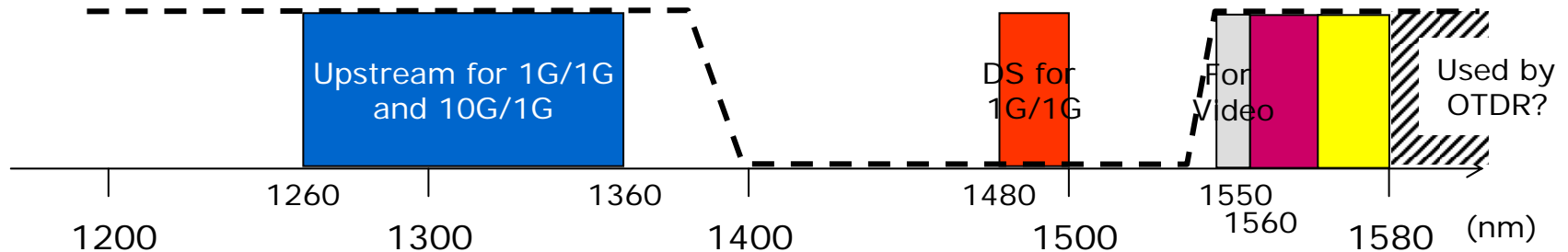
Example of wavelength plan

Solution 1

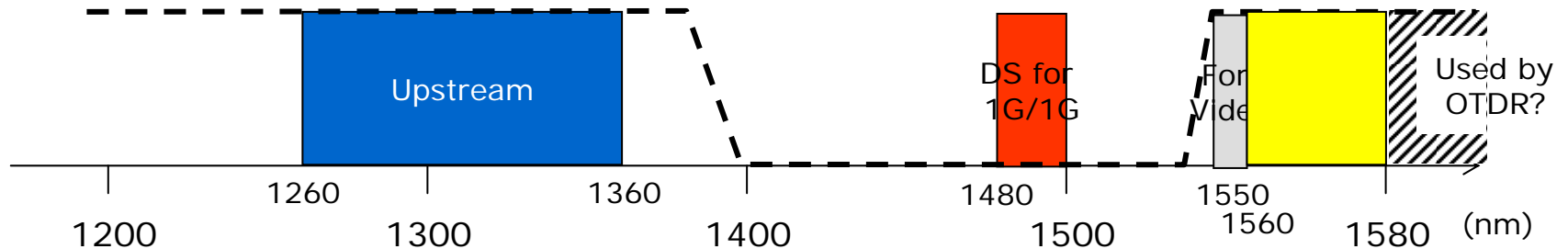
Blocking filter spec for the current deployed 1G/1G-ONU



Solution 2



Solution 3



Observations

Solution		Solution 1 Full WDM	Solution 2 10G/1G WDM	Solution 3 US TDM/ DS WDM
The number of OLT transceivers		6	4	3
Wave-length allocation	1G/1G US	1.31 μm		
	1G/1G DS	1.49 μm		
	1G/10G US	Longer than 1.56 μm	1.31 μm	
	1G/10G DS	Longer than 1.56 μm		
	10G/10G US	Longer than 1.56 μm		1.31 μm
	10G/10G DS	Longer than 1.56 μm		
	Required technique	DWDM		CWDM
10G OLT transmitter		Some dispersion tolerated transmitters, such as external modulated LDs, will be required because wavelength dispersion is relatively high at 1.5 μm wavelength range.		
		Some wavelength stabilization technique, such as temperature control or wavelength locker, is required for DWDM allocation.		No temperature control or wavelength locker might be required.
	Cost	High		Relatively high
10G OLT receiver		10G burst-mode receiver is required.		
		Burst-mode 10G/1G multi-rate receiver is required. Strict IF specification between PMD and control information, such as bit-rate and burst timing, is required to achieve an efficient multi-rate operation. Feasibility study of a multi-rate receiver is required for an accurate cost estimation.		
	Cost	High		Relatively high
10G ONU transmitter		If direct modulated LDs are used in ONU transmitters, some dispersion compensation techniques, such as EDC, might be required. Burst-mode EDC is a challenging technique.		No dispersion compensation techniques will be required.
		Some dispersion tolerated transmitters, such as external modulated LDs, will be needed because wavelength dispersion is relatively high at 1.5 μm wavelength range.		Direct modulated LDs can be used.
	Cost	High		Low
10G ONU receiver		If a direct modulated LD is used in an OLT transmitter, some dispersion compensation techniques, such as EDC, might be required.		
	Cost	Relatively low		

Conclusions

- Solution 3 is the best solution from the viewpoint of cost. However, the feasibility of the multi-rate receiver should need to be studied more.
- Solution 2 may be an alternative option. The future cost trend of the DWDM transmitter should be surveyed from now on.
- A common wavelength for 10G DS and 1G DS is possible? In this slides, it is not considered.
- At least, a common spec with ITU-T on the downstream wavelength is desirable because of the expansion of a market volume of a transceiver.